

What is claimed is:

1. A pretreatment process for solid lump feed material for gas and pellet/lump-based direct reduction processes, comprising:

storing solid lump feed material in a stockpile for a predetermined time, in an open atmosphere, in order to release internal stresses of the sedimentary lump ores;

pre-drying the feed material prior to charging the feed material to a gas-based direct reduction furnace;

increasing the thermal profile of the furnace, to reduce the zone of low-temperature reduction;

thereby minimizing the formation of fines within the furnace.

2. A process according to claim 1, wherein the feed material is stored in a stockpile for at least one month.

3. A process according to claim 1, wherein the feed material is pre-dried at a temperature of about 200C.

4. A process according to claim 1, wherein said pre-drying is accomplished in a feed storage bin by introduction of waste off-gases at a sufficient to heat the feed material in the storage bin.

5. A process according to claim 4 wherein the waste off-gas temperature is in excess of 300C upon introduction into the feed storage bin.

6. A process according to claim 4, wherein said waste off-gases are removed from a reformer associated with the direct reduction process.
7. Apparatus for pre-drying feed material to a direct reduction furnace, comprising:
  - a furnace having an upper feeding and heating portion, a middle gas feeding and reducing portion, and a lower product discharge portion;
  - means for removing hot gas from the furnace;
  - reformer means for reforming removed off-gas, including means for heating the reformer by combustion of gas, and means for removing waste combusted off-gas from the heating of the reformer;
  - a feed material storage bin, said means for removing waste off-gas communicating with said storage bin for heating the contents thereof; and
  - means for transporting the heated feed material to the furnace and for charging the heated feed material into the furnace for reduction.
8. Apparatus according to claim 7 wherein said feed storage bin is enclosed, and said means for transporting the heated feed material to the furnace is insulated.